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Foreign Animal Disease Report

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Emergency Programs Activities

Field Investigations. During the third quarter of fiscal year (FY) 1993 (April 1–June 30, 1993), Veterinary Medical Officers from the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), and the State departments of agriculture conducted 56 investigations of suspicious foreign animal diseases (FAD) in the United States to eliminate the possibility that an exotic disease may have been introduced. These disease conditions included 12 for vesicular disease, 12 for avian disease in pet birds and poultry, 12 for encephalitic disease, 11 for mucosal disease, 4 for septicemia or edema disease, 3 for exotic ticks and screwworms, and 2 for severe respiratory disease.

There were 20 investigations conducted in VS' Northern Region, 12 in the Southeastern Region, 13 in the Central Region, and 11 in the Western Region.

For the first 9 months of the fiscal year, a total of 253 investigations were conducted. All were negative for FAD or exotic pests.

Regional Emergency Animal Disease Eradication Organization (READEO) Test Exercise. During the week of August 9–13, 1993, VS' Western Region participated in a READEO test exercise in Great Falls, MT. The READEO was activated to combat a simulated outbreak of "motchu-kop," a fictitious disease modeled after foot-and-mouth disease. (Motchu-kop translates to "nothing" in Blackfoot Indian dialect.) The outbreak scenario included the spread of the disease between Montana and Alberta, Canada, as well as to free-ranging wildlife in the Yellowstone National Park area. This was the first READEO test exercise that encompassed international participation; Agriculture Canada was an active participant in the planning and implementation of the exercise.

The test exercise addressed several new facets of the READEO: (1) the Recorded Emergency Animal Disease Information (READI) system, a computerized data management program used by the READEO and VS' Emergency Programs to store and manage data gathered from foreign animal disease investigations, successfully

transmitted information between the United States and Canada; (2) the online FTS 2000 mail system was used to transmit information in lieu of facsimile machines; (3) the Geographic Information System was used to map infected and exposed premises in order to analyze disease spread and control; and (4) the efficacy of the newly reorganized READEO structure was assessed.

Members of the READEO met with the Emergency Programs staff at headquarters in Hyattsville, MD, on August 31, 1993, to critique the test exercise. The results are being analyzed and will be used to assist the READEO in the future.

Foreign Animal Disease Training. A "Foreign Animal Disease Diagnostician" training course was held May 2–15, 1993, in Ames, IA, and Plum Island, NY. The "Foreign Animal Diseases: Threats and Implications" course was held July 13–16, at Laurel, MD. The "Wildlife Seminar for Foreign Animal Disease Preparedness" was held in conjunction with the Southeastern Cooperative Wildlife Disease Study, Athens, GA, July 20–22, 1993. A "Texas State Workshop on Foreign Animal Diseases" was held in Houston, TX, August 24–27. The "Military Support to Emergency Animal Disease Programs" course was held in Hyattsville, MD, September 13–17.

Foreign Animal Disease Update

This update consolidates information from Office International des Epizooties (OIE) bulletins into tables covering January 1993 through March 1993. Countries reporting disease outbreaks are listed below the appropriate disease heading (followed by the month/year of the report and total number of outbreaks reported for that time period). The notation "+" indicates that the presence of disease was reported without information on total number of outbreaks. A number followed by "+" indicates that sometimes the country reported the number of outbreaks while other times it reported only the presence of the disease.

Foot-and-Mouth disease

Virus untyped
Argentina (12/92 & 1/93) 32
Bhutan (3/93) 3
Brazil (7–12/92) 546
Cambodia (10&11/92) +
Hong Kong (11&12/92) 7
India (8/92) 53
Iran (7–12/92) 140
Laos (10–12/92) +
Lebanon (1–12/92) +
Myanmar (1/93) 1
Pakistan (9–11/92) 4
Paraguay (1/93) 5
Thailand (12/92) 2

Virus O
Algeria (7–9&12/92) 10
Argentina (12/92 & 1/93) 5
Brazil (7–12/92) 68
Cambodia (6/92) +
Colombia (12/92 & 1/93) 16
Egypt (2/93) 6
Ethiopia (9/92–1/93) +
Ghana (1/93) 6
Hong Kong (1/93) +
Iran (7–9/92) +
Italy (2&3/93) 49
Kenya (1/93) 1
Malaysia (peninsula) (12/92–2/93) 5+
Oman (11–12/92) 25
Pakistan (9–11/92) +
Paraguay (1&2/93) 5
Saudi Arabia (12/92 & 1/93) +
Sri Lanka (10&12/92) 3
Thailand (12/92) 2
Turkey (12/92–2/93) 60

Virus A
Argentina (12/92) 2
Brazil (7&9–12/92) 34
Colombia (1/93) 1
Ethiopia (10/92) +
Kenya (11/92) 1
Pakistan (9–11/92) +
Saudi Arabia (12/92 & 1/93) +
Turkey (12/92 & 1/93) 2
Venezuela (11/92) 1

Virus C
Argentina (12/92 & 1/93) 11
Brazil (9&10/92) 5
Kenya (10/92) 1

Virus Asia I
Laos (2/93) +
Malaysia (peninsula) (12/92 & 1/93) 21
Myanmar (1/93) 1
Thailand (12/92) 14
Vietnam (10/92) +

Vesicular stomatitis

Virus untyped
Panama (1/93) 1

Virus Indiana
Colombia (12/92 & 1/93) 11
El Salvador (9–11/92) 5
Panama (1/93) 1

Virus New Jersey
Colombia (12/92 & 1/93) 32
Costa Rica (9–11/92) 4
El Salvador (9–12/92) 14
Guatemala (10–12/92) 5
Honduras (9–11/92) 5
Mexico (12/92–2/93) 19
Nicaragua (9&10/92) 3
Panama (12/92) 1
Venezuela (11/92) 1

Swine vesicular disease
Belgium (2/93) 1
Italy (3/93) 3
Spain (2/93) 1

Rinderpest
India (8/92) 8
Saudi Arabia (9/92) 5
Sri Lanka (11&12/92) 2
Uganda (8/92) 2

Bluetongue
India (8/92) 7
Lebanon (1–12/92) +
South Africa (12/92–2/93) +
United States (1–3/93) +
Zimbabwe (3/93) 4

Fowl plague
Lebanon (1–12/92) +

Newcastle disease

Virus not characterized
Albania (1–3/93) 22
Angola (2/93) 1
Argentina (12/92 & 1/93) +
Belgium (1/93) 3
Brazil (7–11/92) 45
Bulgaria (1/93) 1
Cambodia (10–12/92) +
China (7–12/92) 124
Cote-d'Ivoire (12/92–2/93) +
Guinea (1&2/93) +
India (8/92) 64
Iran (7–12/92) 265
Laos (11&12/92) 4
Lebanon (1–12/92) +
Madagascar (6/92) +
Malaysia (peninsula) (12/92 & 2/93) 2
Malta (2&3/93) 22*
Mexico (12/92) 3
Mozambique (1–3/93) +
Myanmar (12/92–2/93) 8
Netherlands (12/92–2/93) 15*
Pakistan (9&10/92) 1+
Philippines (11/92) +
Portugal (1/93) 1
Senegal (10/92) +
South Africa (1/93) 1
Tunisia (12/92) 7
Turkey (12/92–2/93) 12
Uganda (1–8/92) +
Uzbekistan (3/93) 1
Zambia (1&2/93) +

* Includes hobby fowl.

Velogenic virus
Botswana (10&11/92) 2
Germany (2/93) 2
Kenya (12/92–2/93) 3
Korea (Republic) (12/92 & 2/93) 7
Luxemburg (3/93) 1
Mauritius (9–12/92) +
Sri Lanka (8–12/92) 87
Sudan (11/92 & 3/93) 2

Rift Valley fever
Mozambique (1–3/93) +
Zambia (11&12/92) +

Sheep and goat pox
Algeria (8/92–3/93) 82
China (People's Republic) (7/92) 2
India (8/92) 7
Iran (7–12/92) 154
Israel (1/93) 3
Israel (Controlled Territories) (1/93) 2
Lebanon (1–12/92) +
Morocco (1/93) 1
Oman (11&12/92) 10
Sri Lanka (10&12/92) 3
Tunisia (12/92) 30
Turkey (12/92–2/93) 30

Peste des petits ruminants
Guinea (1&2/93) +
Israel (1&2/93) 2
Oman (11&12/92) 12
Senegal (10/92) 2

African swine fever
Italy (1–3/93) 19
Mozambique (1–3/93) +
Senegal (10/92) +
Spain (11/92 & 1–3/93) 19
Uganda (1,2&7/92) 3
Zambia (2/93) 3

African horse sickness
Mozambique (1–3/93) +
Senegal (10/92) 3
South Africa (12/92–2/93) +
Zimbabwe (3/93) 4

Hog cholera
Argentina (12/92 & 1/93) +
Austria (1&2/93) 3*
Brazil (7&9–11/92) 100
Bulgaria (1/93) 1
Cambodia (10–12/92) +
Chile (1/93) 1
China (People's Republic) (7–12/92) 104
Czech Republic (12/92 & 1/93) 1*
France (2/93) 1
Germany (1&2/93) 5
Hong Kong (11&12/92) 3
India (8/92) 5
Italy (1–3/93) 4
Japan (12/92) 1
Korea (1/93) 1
Laos (10&12/92) +
Latvia (3/93) 1
Madagascar (6/92) 1
Malaysia (peninsula) (12/92 & 1/93) 2
Mauritius (9–12/92) +
Mexico (12/92 & 2/93) 3
Myanmar (2/93) 1
Slovak Republic (12/92) 1
Sri Lanka (8&12/92) 2
Taipei China (1–3/93) 3

Contagious bovine pleuropneumonia
Cote-d'Ivoire (12/92–2/93) 6
Guinea (1&2/93) +
Italy (1–3/93) 4
Kenya (10/92–2/93) 7
Mali (10–12/92) 3
Senegal (1/93) 1
Spain (1/93) 1
Uganda (1,3,4&7/92) 5

Lumpy skin disease
Botswana (10&11/92) +
Madagascar (6/92) 15
Namibia (2/93) 2
South Africa (12/92–2/93) +
Uganda (1/92) 1
Zambia (11/92–2/93) +
Zimbabwe (1–3/93) 48

* Wild boars.

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Screwworm Eradication Program Update

Mexico. Screwworms entered Mexico on legally imported cattle from Central America. The first positive case was collected January 22, 1992, and the most recent case was collected June 17, 1993. Because it has diverted sterile flies originally destined for Central America, the Mexican outbreak will delay the Central American screwworm eradication effort by at least 2 years. If no further cases are discovered in Mexico, sterile-fly dispersal will be required through December 1993.

The Methods Development Section at the rearing facility passed the new strain (CR-91) to the production department on May 1, 1993. The current production goal is 250 million sterile flies per week.

Guatemala. The dispersal of sterile screwworm flies was initiated in northern Guatemala in September 1988. By January 1991, 100-percent coverage was achieved. The last positive case was reported on May 1, 1993. Dispersal will continue until Mexico is again declared free of screwworm.

Belize. Sterile flies were dispersed over the entire country beginning in April 1990. No cases were reported after October 1991. On June 21, 1992, at Belmopan, Belize was declared technically free of screwworms. Normally, sterile-fly dispersal would have terminated with the declaration; however, sterile flies were released until December 25, 1992, to protect Belize from possible introductions due to the outbreak in Mexico.

El Salvador and Honduras. Sterile-fly release began late in 1991 in both El Salvador and Honduras. The programs are successful, with an average of 0.5 positive case per week reported from El Salvador and less than 30 cases per week reported from Honduras during the period June through August, 1993.

Nicaragua. Dispersal of sterile flies in Nicaragua was delayed until July 1993 because of the outbreak in Mexico. It is too early to expect population reductions due to the sterile-fly release. Nicaragua averaged 198.8 positive cases per week during the period June through August, 1993.

Barrier Zone. The dispersal grids in El Salvador, Honduras, and Nicaragua serve as the current barrier zone. These three countries comprise the largest area requiring treatment since the active eradication zone was in the Yucatan Peninsula of Mexico, Belize, and Guatemala. Eradication of screwworms from Nicaragua will be particularly significant because that country exports cattle both north and south.

Future Activities. A bilateral agreement with Costa Rica cleared both governments and is pending a convenient date for signature. A bilateral agreement with Panama is in the final review process. Funding for construction of a new rearing facility in Panama is actively being sought.

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Bovine Spongiform Encephalopathy (BSE) Update

The following information is excerpted from "Bovine Spongiform Encephalopathy: Implications for the United States," produced by USDA, APHIS, VS, Centers for Epidemiology and Animal Health.

BSE in Great Britain.

1. *What is the current status of the BSE epidemic?*
   - Worldwide, more than 100,000 laboratory-confirmed cases.
   - As of July 2, 1993, more than 99 percent (100,581) of laboratory-confirmed cases have occurred in Great Britain. Within Great Britain:
     - — Of all farms, 27 percent have experienced at least 1 case (45 percent of all dairy farms and 9 percent of all beef farms).
     - — On affected farms, 41 percent have experienced only 1 case; 70 percent have experienced fewer than 3 cases.

2. *What is the current status of spongiform encephalopathies in other species within Great Britain?*
   - In exotic animals: 16 confirmed cases (13 in exotic ruminants, 3 in exotic felines)
   - In domestic cats: 42 confirmed cases in cats (no known cases in dogs)
   - No confirmed cases of spongiform encephalopathies within Cervidae, despite feeding of ruminant-derived rations.

3. *What evidence suggests that the BSE epidemic has peaked?*
   - The number of new herds experiencing BSE cases has fallen off.
   - The number of cases confirmed per month has stopped rising.
   - The total number of cases observed is lower than the number forecast in the absence of control measures.
   - BSE incidence in animals born since 1988 is decreasing.
   - Substantial decreases in the number of newly diagnosed BSE cases are expected in 1994 and beyond as the ban on feeding livestock ruminant-derived meat and bone meal takes effect (since the mean age at onset of clinical signs is between 4 and 5 years).

4. *Has the July 1988 ban on feeding ruminant-derived animal proteins to ruminants reduced the magnitude of the Great Britain epidemic?*
   - As of July 9, 1993, there have been 2,985 confirmed cases of BSE in cattle born after the feed ban.
   - More than 90 percent of the 2,985 cases occurred in cattle born in 1988.
   - Since the beginning of 1990, there have been two cases in cattle born after the ban. Both cases are under further investigation.
   - The age-specific incidence of BSE in cattle born after the ban is less than the comparable age-specific incidence of BSE in cattle born before the ban.
   - The imposition of the feed ban is estimated to have prevented at least 20,000 cases in the year from April 1992 through March 1993.

5. *Will the diagnostic approaches or case management change as the epidemic progresses in Great Britain?*
   - As the number of BSE cases declines, the relative proportion of suspect cattle without BSE will increase. Therefore, revised protocols for examination of BSE cases may become necessary.
   - Veterinary medical officers are already required to revisit BSE suspects born after the feed ban of July 1988 to further rule out alternative diagnoses before euthanizing the cow for histopathologic examination.
   - Alternative postmortem diagnostic approaches, such as electron microscopy and immunohistochemistry, continue to be evaluated. To date, histopathologic examination of the obex region for vacuolation appears to be equally as sensitive and specific as electron microscopy for identification of scrapie-associated fibrils.

6. *Have the epidemiological studies generated any new information about BSE transmission or pathogenesis?*
   - Observations continue to be consistent with a common-source foodborne epidemic with no strong evidence to support a major role for either horizontal or vertical (maternal) transmission.
   - Neither the clinical signs nor the histopathology of BSE has changed over the course of the epidemic.
   - No simple genetic susceptibility factor for BSE has been identified in cattle. If there is a genetic component to susceptibility, then a high proportion of British cattle appear to be susceptible.

7. *What are the latest results of the transmission studies using tissues from BSE-affected cattle?*
   - Under laboratory conditions, oral transmission has been achieved by feeding relatively large amounts of brain tissue to sheep, goats, mink, and mice.
   - The oral infective dose under natural conditions remains unknown.
   - No detectable infectivity has been identified after inoculation of mice with spleen, semen, buffy coat, muscle, bone marrow, placenta, lymph nodes, cerebrospinal fluid, liver, rumen, fetal calf blood, pancreas, and proximal colon tissue.
   - No detectable infectivity has been identified after feeding mice with milk, udder, spleen, placenta, or lymph node.

8. *Have there been any advances in the antemortem diagnosis of BSE?*
   - Electrochemical analysis of urine has tentatively identified relative concentration differences in three constituents between healthy cows and those with BSE.
   - While this analysis of urine is not feasible for large-scale screening or cow-side testing, further analysis of the constituents is underway.
   - Electrophoretic studies of cerebrospinal fluid, urine, and other body fluids continues.

9. *What other studies of BSE are underway at the Central Veterinary Laboratory in the United Kingdom?*
   - Offspring of BSE-affected cows, including embryo transfers, continue to be monitored to address questions concerning maternal transmission. Due to the long incubation period of BSE, these studies will continue 4–7 more years before the results are known.
   - The pathogenesis of BSE in cattle is being evaluated by sacrifice of laboratory-exposed calves at 6-month intervals from birth. Exposure took place in December 1991.
   - Infective dose and incubation are being examined by oral exposure of calves to different doses of brain homogenate. Calves were exposed in January 1992.
   - Transmission studies with oral exposure of pigs and chickens have not yet been completed.
   - An epidemiological case-control study of BSE cases in animals born after the feed ban is underway to address the risk of contaminated feed carryover, exposure to BSE cases, or maternal transmission. Preliminary results are expected in early 1994.

10. *What have been the BSE disposal, compensation, and research costs in Great Britain?*
    - Through March 1993, approximately $200 million has been spent for compensation and disposal.
    - Approximately $50 million has been spent on research and development.
    - Expenditures for office and field support and lost domestic and international markets for live animals and cattle-related products have not been estimated.

11. *Has BSE reduced the demand for beef within Great Britain?*
    - Prior to BSE, beef consumption was on a slow downward trend.
    - Early in the epidemic, beef slaughter initially declined by approximately 30 percent but then resumed at previous levels.
    - BSE has not caused a long-term negative decline in overall domestic consumption.

Risk Factors for BSE in the United States.

A current review of BSE in the United Kingdom confirms that the course of the epidemic in consistent with the original hypothesis that meat and bone meal containing scrapie agent was incorporated into feed concentrates for cattle. Although new cases have occurred in cattle born after the July 1988 ban of specified offal in ruminant feed, almost all of the involved animals had access to feeds prepared prior to the ban. Additional new clinical cases can be expected for some time because the mean age for onset of clinical signs is about 5 years.

Changes in sheep demographics for the United States since the initial BSE risk assessment in 1991 have been minimal. Inventories of stock sheep 1 year or older

are down by 1.1 million from January 1, 1990. The number of mature sheep slaughtered in 1992 was more than 24,000 lower than in 1989. The ratio of mature sheep to beef and dairy cows was slightly lower in 1992 than in 1989. The number of newly detected scrapie flocks per 10,000 flocks has changed little since 1988.

The 1992 distribution of sheep and sheep flocks is similar to that of 1989. The largest numbers of sheep still occur in the Western States, while the largest number of flocks is in the North Central United States. Most of the newly detected scrapie flocks are in the eastern portion of the United States. This fact may be related to husbandry practices. Housing sheep at high densities, which is common in the East, may result in more frequent observations and hence a greater likelihood of detecting sick animals. These same factors, however, could also be responsible for a higher frequency of scrapie transmission among sheep in high-density circumstances.

Practices within the rendering industry that were considered at highest risk for incorporation of scrapie agent into meat and bone meal decreased from 1985 to 1990. The procurement of offal for rendering and the distribution of meat and bone meal are generally limited to 150 miles from renderers. Most of the meat and bone meal used by feed manufacturers is obtained within a limited geographic area, and sales of feeds tend to be likewise limited. Thus, the risk of scrapie agent transmission in feeds containing meat and bone meal would probably be infrequent and geographically limited.

Overall, there appears to be a lower risk of scrapie-induced BSE in the United States today as compared to 1989 (table 1). However, newly infected scrapie flocks continue to be found, and practices continue in both the rendering and feed industries that allow for the possibility of sheep scrapie agent being incorporated into ruminant feeds.

Table 1—Summary of risk factors for BSE in the United States: 1992 *vs.* 1989

Risk factor	Change from 1989	BSE risk compared to 1989
Mature sheep population	Decrease	Reduced risk
Ratio of mature sheep to beef and dairy cows	Decrease	Reduced risk
Scrapie status	Voluntary flock certification	Potential reduced risk
Mature sheep slaughter and deaths	Decrease	Reduced risk
Mature sheep rendering and feed manufacturing	Decrease	Reduced risk
Protein sources for calf milk replacers and starter rations	No change	No change in risk

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Avian Influenza Virus in Ratites–1993

As part of VS' ongoing surveillance activities for avian influenza (AI), subtypes H5N2 and H7N1 were recovered from emus and rheas in Texas, and subtype H7N1 was isolated from a rhea in North Carolina during the summer of 1993. There are no published reports in the scientific literature about AI disease in rheas or emus.

On July 2, 1993, the National Veterinary Services Laboratories (NVSL) in Ames, IA, received two AI virus isolates from emu and rhea specimens that were recovered by the Texas State Veterinary Diagnostic Laboratory. NVSL classified both viruses as AI subtype H5N2 on July 6, 1993. Another AI virus, isolated from a rhea specimen in North Carolina, was classified as subtype H7N1 on the same day. Fourteen days later, NVSL isolated the subtype H7N1 AI virus from surveillance specimens submitted from a third premises in Texas.

NVSL began studies to determine virus pathogenicity in chickens on July 7, 1993, and concluded the studies on July 16. Because some of the ratite premises were in close proximity to commercial turkey flocks, further studies on virus pathogenicity utilizing turkey poults were begun July 21 and concluded July 29. The results of these NVSL studies indicated that none of these AI viruses were pathogenic to chickens or turkeys. Samples of both virus subtypes were forwarded to the Department of Virology and Molecular Biology at St. Jude Children's Research Hospital in Memphis, TN, for gene molecular characterization. Researchers at St. Jude reported the AI subtype H5N2 virus was similar to the AI virus recovered earlier in the year from live-poultry markets in the Northeast and to the virus recovered from sentinel chickens in Miami, FL. The AI subtype H7N1 had not been identified before but was determined to be nonpathogenic.

The initial AI virus found in Texas, subtype H5N2, was obtained by the Texas Veterinary Medical Diagnostic Laboratory from two separate samples submitted by private veterinarians. The first virus was isolated on June 9, 1993, from an emu chick that was received from an owner in Burnet County; the second virus was collected on June 15 from a rhea in Brazoria County. Both isolates were referred to NVSL on July 2. On July 20, as a result of the animal disease investigations that stemmed from these AI isolates, NVSL isolated a third virus, subtype H7N1, from an emu in Travis County, TX.

During this same time period, the North Carolina AI virus, subtype H7N1, was isolated from a young rhea in Union County by the Rollins Veterinary Diagnostic Laboratory in Raleigh and forwarded to NVSL. Epidemiologic investigations traced the rhea to an exotic-animal sale in Harper, TX. Other rheas in the flock had serological titers for subtype H7N1, but no further evidence of the AI virus was found in other rhea or turkey flocks in North Carolina.

VS epidemiologic investigations found that all of the ratites had been purchased though an exotic animal sale in Lampasas, TX, on May 12–14, 1993, and an exotic animal auction in Harper, TX, on May 22, 1993. One infected rhea was part of a consignment that went through both auctions. Also, the affected rhea in North Carolina was purchased at the Harper auction. Sale records indicated that the auction in Harper had 23 in-state buyers and 2 out-of-state buyers; the sale in Lampasas had 86 in-state buyers, 32 out-of-state buyers, and 1 buyer from Ontario, Canada. As a result, 10 States received ratites from the two auctions: Arizona, Georgia, Louisiana, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Tennessee, and Texas.

VS veterinarians contacted all of the ratite buyers associated with either of the two sales and discovered that many of the birds had changed ownership several times since the sale dates in May. All purchased ratites remaining in the original buyers' care, along with any other birds on their premises, were inspected and tested for AI. Additionally, any ratites that had been in contact with the auction birds were also inspected and tested.

The results of NVSL's testing revealed serologic evidence for exposure to many AI subtypes, including: H3, H5, H6, H7, H9, N1, N2, N4, N8, and N9 antibody subtypes. These results indicate that there is a wide variety of AI subtypes circulating in the environment. Many of the ratites also had titers for *Chlamydia psittaci,* and some were culture positive for bacteria that include salmonella and streptococcus. Several bird buyers reported that some young emus and rheas died shortly after being transported to their premises. Others reported that the ratites were sick upon arrival but responded to antibiotic treatment and recovered. There has been no evidence of specific disease due to AI in the ratite flocks.

Following VS' actions with the AI surveillance program for ratites, 14 States added requirements for premovement testing and inspection and now require entry permits for ratites.

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Venezuelan Equine Encephalitis (VEE) in Mexico–Summer 1993

In late June 1993, horses from the State of Chiapas, Mexico, were reported as showing central nervous system signs that suggested VEE. Mexico's National Emergency System on Animal Health (SINESA) immediately initiated field investigations, assisted by the Mexico–United States Exotic Animal Disease Commission (EADC).

A positive laboratory diagnosis for VEE was established at the EADC laboratory in Mexico City on July 14, 1993. NVSL confirmed the virus as type 1-E on August 11, 1993. The Yale Arbovirus Research Unit, New Haven, CT, also confirmed this diagnosis. Type 1-E is known to occur in the State of Chiapas and was previously considered to be an enzootic strain. Enzootic VEE is traditionally nonpathogenic to horses and is associated with rodent reservoirs. Prior to this outbreak, only the 1-A/B and 1-C VEE viral strains were considered epizootic in horses.

Upon receiving a confirmed diagnosis of VEE, Mexico initiated control measures, including a quarantine of the affected area, on July 15, 1993. An equine vaccination campaign began on July 17, 1993.

The following outbreak information is current through August 13, 1993:

1. Investigations performed: 158
2. Horses clinically affected: 136 (61 deaths)
3. Horses vaccinated in Chiapas: about 35,500
4. Last clinical case and last equine death: July 25, 1993
5. Other Mexican States affected: none

As of August 26, 1993, there have been no confirmed human cases associated with this outbreak. Mexican public health officials are monitoring the surveillance efforts in humans. EADC laboratory personnel have been administered a human VEE vaccine. Mexico considers the outbreak controlled and lifted the quarantine of Chiapas on

August 25, 1993. VEE vaccination will continue to be required of all horses moving out of the affected area. Surveillance efforts and vaccination within neighboring Mexican States will also continue. As of August 26, 1993, the restrictions on equine movements from Mexico to the United States continued to be in effect. These VEE restrictions require a 7-day isolation in vector-proof facilities at the U.S.–Mexican border prior to entry into the United States.

[Information provided by Dr. Peter Fernandez, Codirector, EADC, IS, APHIS, USDA, Mexico City, Mexico.]

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Duck Plague in California, Maryland, and South Carolina

Duck plague, also known as duck virus enteritis (DVE), recently gained national attention as the news media spotlighted efforts of a small group of people to stop the depopulation of an affected flock of semiwild waterfowl in Venice, CA. A vocal minority filed for a temporary restraining order against the California Department of Fish and Game (CDFG) in their effort to depopulate the remaining birds. The CDFG, advised by the U.S. Department of the Interior, Fish and Wildlife Service's National Wildlife Health Research Center and the Southeastern Cooperative Wildlife Disease Study (SCWDS), maintained that destruction of the ducks was necessary because the exposed birds were a potential threat to nearby wild waterfowl populations. Surviving ducks can be long-term virus carriers, and there is no reliable way to detect disease in waterfowl that have "silent" infections. The court allowed the depopulation to proceed on June 10, 1993, but by that time protestors had moved several birds to other locations.

The California outbreak was not the only time that duck plague surfaced this year. The disease also was confirmed in a group of semiwild waterfowl on a 33-acre lake on Ft. Jackson, SC, in early May. SCWDS personnel, working in cooperation with the army base veterinarian and wildlife staff at Ft. Jackson and with the South Carolina Wildlife and Marine Resources Department, depopulated these birds in early June. Another outbreak occurred in a private waterfowl collection in Maryland. There, surviving birds have been confined in a lifetime quarantine.

Duck plague is caused by a herpesvirus and affects only birds of the order Anseriformes (ducks, geese, and swans). The first U.S. outbreak was in commercial Pekin ducks on Long Island, NY, in 1967. The virus "spilled over" into wild waterfowl, killing several hundred birds. In 1973, a massive outbreak on Lake Andes National Wildlife Refuge in South Dakota killed approximately 43,000 ducks and 250 Canada geese.

There have been 67 confirmed outbreaks of duck plague in the United States associated with nonmigratory birds on public park ponds, in private waterfowl collections, and at duck farms or shooting preserves. In contrast, DVE virus has been isolated only three times from wild migratory birds, and all three were individual cases. Muscovy ducks are highly susceptible to infection and usually become acutely ill and die; other species of ducks vary in susceptibility, and some survive infection. Surviving birds may intermittently shed virus for up to 5 years following infection. Additionally, infected ducks may have poor reproduction, and virus may be transmitted through eggs to the

next generation. Detection of carrier birds is nearly impossible because of the intermittent nature of virus shedding and the fact that both antibody-positive and antibody-negative birds may shed virus.

Vaccination of waterfowl has been proposed as an alternative to depopulation, but the current vaccine is effective only in Pekin ducks and only when vaccine is administered prior to virus exposure. The vaccine has not been tested adequately in wild North American waterfowl; however, preliminary data suggest that some species are not protected and in some instances may actually become more susceptible to disease after vaccination. The effect of vaccination on virus shedding remains unknown; therefore, vaccination cannot be relied upon to reduce or eliminate inapparent carriers and may represent a risk to wild waterfowl.

Although unpopular with some members of the public, depopulation of directly exposed ducks currently is the only feasible method of reducing the threat of duck plague to free-flying migratory waterfowl. All exposed birds and their eggs must be removed from an infected premises. Additionally, the area should be treated with an appropriate disinfectant, and the impounded water drained or altered to a highly basic or highly acidic pH. After depopulation, a prolonged waiting period is recommended before waterfowl are allowed to repopulate the area.

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Arboviral Diseases in the United States–1992

During 1992, health departments from 23 States reported to the Centers for Disease Control and Prevention (CDCP) 45 cases of arboviral encephalitis in humans and 97 cases in horses. An additional four States reported detection of arboviral activity in bird and mosquito populations. This report summarizes information regarding arboviral encephalitis in the United States during 1992.

Eastern Equine Encephalitis (EEE) and Western Equine Encephalitis (WEE). EEE and WEE are transmitted by biting insects to a variety of mammalian hosts, including humans, with wild birds serving as principal reservoirs. These reservoir hosts tend to develop viremia adequate to infect vectors and actively contribute to the cycle of virus survival. Horses are considered dead-end hosts for WEE; horses with EEE infections may develop viremia adequate to infect vectors but probably do not contribute significantly to viral transmission or persistence. Humans can develop a fatal encephalitis due to EEE or WEE through the bite of an infected insect.

In 1992, 88 cases of EEE in horses were reported from Florida (54 cases), Georgia (9), Virginia (9), Mississippi (4), South Carolina (4), North Carolina (3), Texas (2), Arkansas (1), Kentucky (1), and Michigan (1). Nine cases of WEE in horses were reported in 1992: Idaho (2), Missouri (2), Oklahoma (2), Colorado (1), South Dakota (1), and Utah (1).

During 1992, Florida and Massachusetts each reported one human case of EEE. Because of isolation of EEE virus from *Aedes albopictus,* a more anthropophilic vector, during 1991 in Florida, human case surveillance was intensified at five regional

medical centers. From May through September 1992, 357 cerebrospinal fluid samples were collected from persons with symptoms suggestive of meningitis or encephalitis. None had EEE-specific immunoglobulin M antibody. There were no cases of WEE reported in humans in 1992.

St. Louis Encephalitis (SLE) and LaCrosse Encephalitis (LAC). St. Louis encephalitis virus has been isolated from wild birds, domestic fowl, and horses but has not been shown to cause disease in these hosts. LaCrosse encephalitis is transmitted in a rodent–mosquito–rodent cycle, with man tangentially infected. Both SLE and LAC can cause fatal meningitis and encephalitis in humans.

During 1992, 14 sporadic human SLE cases occurred in Texas (12) and California (2), a substantial decrease from 1990 and 1991 (247 and 78, respectively), when SLE cases were at their highest level since 1976. Twenty-nine cases of LAC were reported in 1992 in Illinois (7), Ohio (6), West Virginia (6), Wisconsin (4), Minnesota (3), and North Carolina (3). This is the lowest number of human LAC cases reported since surveillance began in 1964.

Enzootic Arbovirus Activity. In 1992, 28 States conducted arboviral surveillance using virus isolation or antigen detection in captured mosquitoes or viral-specific antibody assays in sentinel or wild birds. Enzootic arboviral activity was reported from 16 States: EEE (Delaware, Florida, Georgia, Massachusetts, Michigan, New Jersey, North Carolina, Ohio, and South Carolina); WEE (Arizona, California, Colorado, Nevada, and Utah), SLE (Arizona, California, Illinois, Michigan, and Texas), and LAC (Illinois).

Such serosurveys indicate that arboviral infections have a wide geographic distribution in the United States, but it is felt that cases are often underreported. Because early recognition of arboviral activity allows for early institution of preventive measures, surveillance of virus activity in mosquito, avian, equine, and human populations has been emphasized.

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